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Heads UP!



Since it began collecting data in 2013, HAWC has gathered high-energy images of objects near and far, including the Crab Nebula, star clusters in the Milky Way galaxy, and the active galactic nucleus Markarian 421.



HAWC to study universe's most energetic phenomena

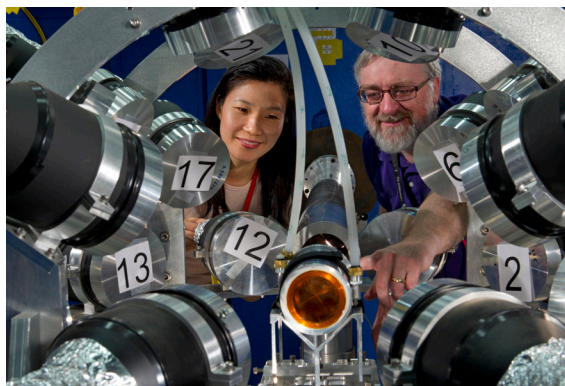
The High Altitude Water Cherenkov (HAWC) Gamma-Ray Observatory, a joint project involving the Laboratory, academia, the National Science Foundation, the United States and Mexico and other agencies, soon will begin collecting data at full capacity to study the universe's most energetic phenomena. An inaugural event took place in March to mark the completion of its construction. HAWC is located 13,500 feet above sea level on the slopes of Mexico's Volcan Sierra Negra.

"The HAWC observatory will detect the highest energy photons ever observed," said Brenda Dingus (Neutron Science and Technology, P-23), LANL principal investigator for HAWC. "These photons point back to astrophysical sources that accelerate particles to energies millions of time higher than man-made particle accelerators. These photons also could be produced by dark matter, which would tell us about these as yet unknown type of fundamental particles that compose most of the mass of the universe."

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Successful LANSCE run cycle delivers stockpile stewardship, national security science

The Los Alamos Neutron Science Center (LANSCE) had an outstanding run cycle, achieving full production on Oct. 19 and operating through Feb. 8. LANSCE provides required research for stockpile stewardship and national security and helps maintain and grow the excellence of the NNSA science base to ensure the quality of scientific and technical staff that ensures the stockpile is safe, secure, and effective.



The Chi-Nu detector array

The LANSCE LINAC drives six end-stations or targets for a broad spectrum of fundamental and applied programmatic and scientific research: the Proton Radiography Facility, Targets 2 and 4 at the Weapons Neutron Research (WNR) Facility; Target 1 at the Lujan Center; the Isotope Production Facility; and the Ultracold Neutron Facility.

continued on next page

HAWC cont.

Each of HAWC's detectors is a tank containing 50,000 gallons of ultrapure water with four light sensors anchored to the floor. When gamma rays or cosmic rays reach Earth's atmosphere they set off a cascade of charged particles, and when these particles reach the water in HAWC's detectors, they produce a cone-shaped flash of light known as Cherenkov radiation. The light sensors record each flash of Cherenkov radiation inside the detector tanks. By comparing nanosecond differences in arrival times at each light sensor, scientists can reconstruct the angle of travel for each particle cascade. The intensity of the light indicates the primary particle's energy, and the pattern of detector hits can distinguish between gamma rays and cosmic rays. With 300 detectors spread over nearly three football fields, HAWC is able to "see" these events in relatively high resolution.

The team's major science goals include studying active galactic nuclei—the bright outputs of energy associated with the growth of supermassive black holes at the center of some galaxies—as well as tracking gamma ray bursts and other large explosions. The researchers will also work to determine the enigmatic nature of cosmic rays themselves.

The National Science Foundation, the Department of Energy Office of Science, and Los Alamos National Laboratory provided funding for the United States' participation in the HAWC project. The Consejo Nacional de Ciencia y Tecnología is the primary funder for Mexican participation. For more information, please see www.lanl.gov/discover/news-release-archive/2015/March/03.20-hawk-observatory-universes-most-energetic-phenomena.php.

LANSCE cont.

Members of Accelerator Operations delivered 6411 scheduled hours with 80.2 percent reliability. The most complex maintenance and construction outage in two decades contributed to that success. Improvements included the first of three new, fully redesigned 201.25 MHz RF power amplifiers; new water systems for drift tube linac tank #2; upgrades to the LINAC control system; a new Target 4 WNR spallation target, cooling, and control system; a new fire suppression system in the WNR blue room; repairs to a critical beam transport magnet damaged in a major failure and implementation of related corrective actions; and integrated operations plan at Lujan and WNR as promised in the ^{99}Tc corrective action plan.

The majority of the research conducted served NNSA initiatives. Key nuclear science research performed at LANSCE this run cycle included development of the Time Projection Chamber technique to reduce the uncertainties in the ^{239}Pu fission cross section to $\sim 1\%$ (Target 4-WNR); commission and operation of the Chi-Nu experiment, including precise measurement of ^{239}Pu and ^{235}U prompt fission neutron spectra in energy regions where the data is poorly known (Target 4-WNR); and first total kinetic energy measurements on Pu fission fragments (Target 1-Lujan Center).

Key material/high explosive science properties and dynamics research at LANSCE included insensitive high explosive detonation studies and modeling; electromagnetic-driven damaged surface hydro experiments (PHELIX); casting and additive manufacturing studies; residual stress, texture measurements in weapons components (Target 1-Lujan); and microstructural properties of additively manufactured U-6Nb (Target 1-Lujan).

The LANSCE FY15 run cycle—principally supported by Science Campaigns, Directed Stockpile Work, Laboratory Directed Research and Development, and Work for Others—was productive and included the following highlights:

- Enhanced Surveillance: High energy neutron imaging used to image national security objects with unpredicted success
- DSW-LEP: Characterization of WR-parts for Sandia (PANTEX) on the Spectrometer for Materials Research at Temperature and Stress (SMARTS)
- Global Security: First testing of semiconductor devices for failures due to thermal neutrons for space and avionics electronics
- Campaign 1:
 - First-time neutron reflectometry performed on PuOx thin layers prepared by polymer-assisted deposition (Asterix)
 - Plutonium experiments carried out on more than eight instruments in the facility to study fission neutron spectra, as well as to characterize materials properties and aging (bulk and thin films NPDF, FDS, LQD, Asterix, Chi-Nu, TPC, TKE, SPIDER)
 - Chi-Nu: Prompt fission neutron spectra data on ^{235}U and ^{239}Pu data collected
 - TKE (fission fragment total kinetic energy): First data available at $E > 5$ MeV of multi-chance fission data on ^{239}Pu data 0.7 MeV to > 20 MeV; also data collected on the thermal range.
 - High explosive: Texture evolution during compaction and thermal cycling of solid TATB (SMARTS, HIPPO)
- Campaign 2:
 - Interactions between explosive crystals and binders used in plastic-bonded explosives using neutron reflectometry
 - Additive manufacturing: Microstructure of 316L steel, U6Nb on HIPPO and SMARTS to study composition (with Lawrence Livermore National Laboratory), residual stress and deformation mechanisms, texture and microstructure (grain size, micro-strain)

As the Laboratory looks toward the MaRIE (Matter-Radiation Interactions in Extremes) experimental facility, LANSCE will continue to evolve capabilities to meet the specific demands of national security and the broader requirements for achieving scientific excellence.

For more information, please see lansce.lanl.gov.

Technical contact: Kurt Schoenberg

Physics staff in the news

Prestridge to serve on editorial advisory board of fluid dynamics journal

Kathy Prestridge, leader of the Extreme Fluids Team in P-23, has accepted an invitation from Springer-Verlag to be a member of the Editorial Advisory Board of the journal *Experiments in Fluids* beginning with the May 2015 issue.



Experiments in Fluids is the primary journal in fluid dynamics for communicating advanced and novel flow measurement techniques that bring new physical insights to fluid flows. As a member of the Editorial Advisory Board, Prestridge will advise the editors in her areas of technical expertise, review and adjudicate manuscripts, and encourage submissions to the journal. Over the past decade, Prestridge has developed a strong experimental fluids program in Physics Division in the areas of mixing and turbulence, and this appointment is recognition of the influence and importance of her experimental work in the fluid dynamics community.

Prestridge's Extreme Fluids Team specializes in applying cutting-edge diagnostics to flows that are high-speed and difficult to measure. New physical insights into shock-driven turbulent mixing and multiphase flows provide important data in support of Los Alamos's Common Model for mixing. By performing experiments at the small, laboratory scale, Prestridge's team is able to not only make important, novel measurements, but to perform parametric analyses of difficult mixing and hydrodynamic problems. These analyses are incorporated into models for better predictions of complex flows. Her work is supported by Science Campaigns in support of predictive science, advanced strategic computing and modeling efforts.

Prestridge received the DOE/NSA Defense Programs Award of Excellence in 2003, 2005, 2007, and 2013. She won the Postdoctoral Publication Prize in Experimental Science in 2001, and the LANL Star Award for contributions to the Laboratory and Community in 2008. Prestridge is Chair of the American Physical Society's Committee on the Status of Women in Physics, and she is co-investigator on a National Science Foundation Grant for the APS's Professional Skills Development Workshops. Prestridge has mentored 10 postdocs and 20 students over the past decade.

Mejia-Alvarez recognized with Outstanding Young Alumni Award

Ricardo Mejia-Alvarez recently received the Outstanding Young Alumni Award in the Department of Mechanical Science and Engineering at the University of Illinois at Urbana-Champaign. "The inaugural award recognizes recent alumni who have excelled early in their career, distinguishing themselves in a professional or technical capacity. Recipients are nominated by department professors, staff, and alumni board members."



Mejia-Alvarez joined Los Alamos National Laboratory as a postdoctoral research associate in 2010, having earned his Ph.D. and M.S. degrees in theoretical and applied mechanics from the University of Illinois at Urbana-Champaign, and in 2013, became a staff scientist on the Extreme Fluids Team in Neutron Science and Technology (P-23). His research interests focus on shock-driven fluid instabilities, turbulent boundary layers, and free shear flows of non-Newtonian fluids.

As a member of the Extreme Fluids Team, Mejia-Alvarez conducts experimental research of Richtmyer-Meshkov instabilities. This work is aimed at understanding the role shock-driven turbulent mixing plays in phenomena that range from inertial confinement fusion to supernova explosions. Mejia-Alvarez's research is part of the High Energy Density Plasmas and Fluid thrust of LANL's Nuclear and Particle Futures science pillar.

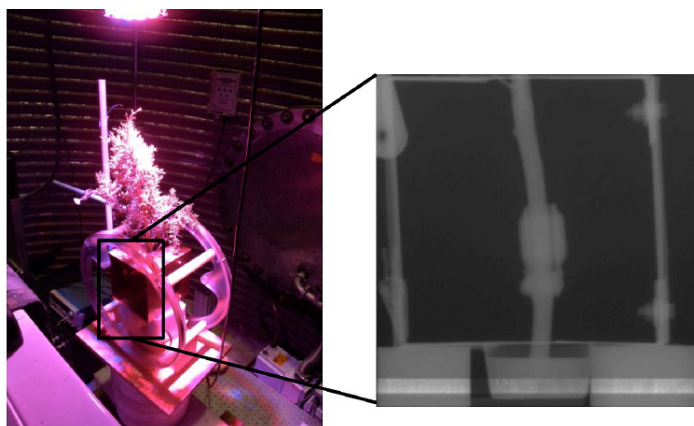
Technical contact: Ricardo Mejia-Alvarez

Combined capabilities reveal how trees transport water

Los Alamos researchers have made the first simultaneous measurements of ultra-low-field nuclear magnetic resonance (ULF-NMR) and neutron imaging to visualize the movement of water in trees. Water use by trees is a key part of the hydrological process linking soil to climate and local weather. Despite decades of research and method development, non-destructive, *in vivo* measurements of water uptake and flow in trees are unavailable for field-based measurement. The lack of measurements limits progress towards understanding this important climate factor. Measurement challenges arise from the opacity of wood and the intricate nature of the water transport system, where opposing pressure gradients in adjacent tissues are responsible for water uptake from the soil and delivery of carbohydrates produced in the leaves.

continued on next page

Combined cont.



Left: Photograph of the NMR and neutron beam setup. Neutrons enter at right, the NMR system surrounds the juniper branch, and the neutron detector is at left. Right: Inset shows a neutron radiography image of the setup. The branch is in the middle, the bars on both sides are the NMR shield, and the thickening on the branch is the NMR coil.

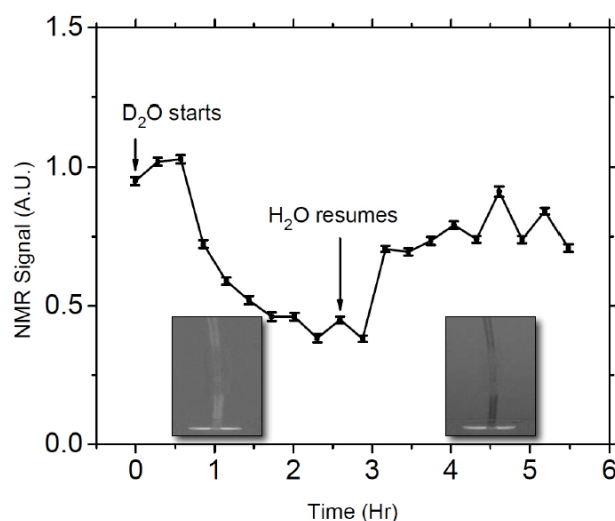
To overcome these methodological challenges, Los Alamos researchers from Earth System Observations (EES-14), Applied Modern Physics (P-21), and Inorganic, Isotope and Actinide Chemistry (C-IIAC) developed an ULF-NMR system suitable for use in ambient, outdoor environments to monitor long-term changes in the water contents of living trees nondestructively. Other NMR systems work in regulated temperatures, requiring a cooled magnet and maintaining the system at constant temperature. The ULF-NMR system does not need cooling. *Review of Scientific Instruments* reported this system. Reference: “Low-field Nuclear Magnetic Resonance for the In Vivo Study of Water Content in Trees,” *Review of Scientific Instruments* **85**, 095110 (2014). Authors include Jacob Yoder (C-IIAC), Michael W. Malone and Michelle A. Espy (P-21), and Sanna Sevanto (EES-14).

The Laboratory scientists aimed to move toward field application by calibrating the NMR signal for water uptake by different tissues. Therefore, the team and colleagues from Non-Destructive Testing and Evaluation (AET-6), Materials Science in Radiation and Dynamics Extremes (MST-8), and LANSCE Weapons Physics (P-27) conducted simultaneous neutron radiography and ULF-NMR measurements at the Los Alamos Neutron Science Center of D_2O (i.e., deuterium, also known as “heavy water”) uptake by living branches. The researchers used the 60-meter Lujan Center Flight Path 5 neutron beam line. Both NMR and neutron imaging allow differentiation between D_2O and H_2O (the more common isotope of water). Alternate watering of branches with these two water sources enabled the researchers to measure the flow rates with both systems simultaneously and compare them. The team also added a surfactant to the source water, thereby changing its surface tension and inducing bubble formation (cavitation) in the branch’s water conductive tissue. This condition induced failure of the con-

ductive tissue to simulate drought conditions in nature. This measurement of NMR during active neutron imaging was the first of its kind. Simultaneous decline in the NMR and neutron signal (see figure below) proved the feasibility of the method. Exploration of the rates of change in signal amplitudes indicates approximately 70% of the NMR signal is due to water moving rapidly towards the leaves in the water-conductive tissue. The remaining approximately 30% of the NMR signal results from slowly moving or bound water within cells and/or tissues related to carbohydrate transport and storage. The success of these measurements proves the concept of nondestructive water flow detection with ULF-NMR and the utility of simultaneous NMR and neutron imaging measurements. This new capability opens myriad possibilities for enhanced visualization of water and carbohydrate transport processes in trees.

The Los Alamos research team for the combined ULF-NMR and neutron imaging studies included Sevanto, Espy Malone, L. Turin Dickman (EES-14), James Hunter (AET-6), Ron Nelson (P-27), Jacob Yoder (C-IIAC), and Sven Vogel (MST-8). The Laboratory Directed Research and Development program funded the work, which supports the Lab’s Global Security mission area and the Science of Signatures science pillar through the capability to monitor the impact of drought on vegetation. A PADSTE (Principal Associate Directorate for Science, Technology, and Engineering) small equipment grant purchased the neutron imaging equipment. NNSA Weapons Campaign 8 (Enhanced Surveillance) sponsored the development and operation of the neutron imaging detector.

Technical contacts: Sanna Sevanto and Michelle Espy



NMR signature and two neutron images of the branch taken during NMR measurements. Neutron radiographs were made at the time indicated on the scale. D_2O uptake is revealed in the radiographs as the white color in the branch, H_2O as the black color. The NMR signal declines when D_2O is replacing H_2O , and increases as the plant is re-watered with H_2O . The differenced images show the progress of D_2O uptake, which appears as lighter regions (left). Rewatering with H_2O appears as darker regions in the differenced image (right).

Rapid heating of materials beyond 10,000 K

Trident Laser Facility enables experiment and first-ever recording of the process

Los Alamos researchers have developed a novel way of heating materials beyond 10,000 K uniformly and instantaneously. Plasma Physics (P-24) researchers recently used a laser-driven aluminum ion beam to heat gold and diamond to 64,000 K and 20,000 K, respectively, and then, in a first-ever feat, successfully recorded the process. The researchers expect that these new observations and techniques will have a direct impact on the plasma physics community, enabling a better understanding of matter subjected to extremes of temperature and pressure, as well as how heterogeneous material interfaces subjected to such conditions mix and evolve.

Although matter at such an extreme state, known as warm dense matter (WDM), is commonly found in astrophysics (e.g., in planetary cores) as well as in high energy density physics experiments, WDM properties are not well understood and are difficult to predict theoretically. This is because neither the approximations made to describe solid materials, nor those made to describe high-temperature plasmas are valid in this intermediate regime.

Acceleration of ions with an intense short laser pulse has been an active area of research in laser-plasma physics over the past two decades. When such an ion beam is incident on a cold target, the energetic ions can transfer a significant amount of their kinetic energy to the target. This heating occurs so quickly (< 50 picoseconds) that the target does not have time to expand during heating (isochoric heating). Once a cold, solid target is heated isochorically by energetic ions, it expands adiabatically into a vacuum and this expansion can, in principle, be recorded. Visualization of this expansion, however, has been challenging, primarily owing to geometric constraints: it is difficult to simultaneously locate a target close enough to the ion source to be heated effectively, yet far enough away to enable optical or x-ray back-lighting of the expanding plasma.

With a strong ion source developed recently on the Trident Laser Facility (P-24), the researchers were able to heat both

gold and diamond foils uniformly and isochorically to WDM states at a sufficiently large source-to-target distance. Then, they successfully visualized the expanding warm dense gold and diamond using an optical streak camera (see figure), which has never been done before.

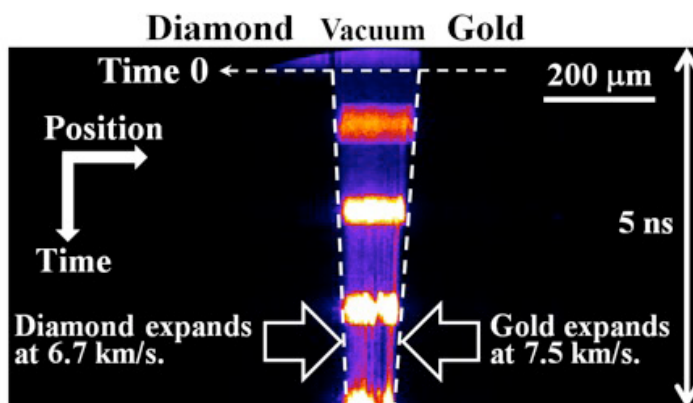
From the streaked image, they measured the expansion speeds of gold and diamond. Computer simulations indicate that the measured speeds correspond to 64,000 ($\pm 6,000$) K for gold and 20,000 ($\pm 1,000$) K for diamond, which is a new technique for determining the temperature of warm dense plasmas. The expected plasma temperatures using the total deposited energy into the cold targets and SESAME equation-of-state (EOS) tables are in good agreement with the plasma temperatures determined by their expansion speeds.

This approach also enables equation-of-state measurements to be made in difficult-to-access experimental regimes by uniformly and instantaneously heating a solid-density target beyond 10,000 K. This uniformly heated WDM target is also a good candidate for conductivity and opacity measurements. Astrophysicists may also find such targets to be useful for validating their understanding of the conditions of giant planet interiors. The resulting warm dense plasmas can be directly used for stopping power measurements benefiting nuclear physics, too.

This work represents a good example of a successful Lab-wide collaboration: the targets were prepared by Polymers and Coatings (MST-7) researchers, computer simulations performed at Eulerian Codes (XCP-2) and Plasma Theory and Applications (XCP-6); SESAME EOS tables provided by S. Crockett (Physics and Chemistry of Materials, T-1) and K. G. Honnell (Materials and Physical Data, XCP-5), and actual experiments conducted by P-24 researchers using the Trident Laser Facility.

Reference: "Visualization of expanding warm dense matter heated isochorically by laser-generated ion beams," LA-UR-15-20385 (2015). (submitted to *Physical Review Letters*) Authors include W. Bang (P-24), P.A. Bradley (XCP-6), D. C. Gautier and S. Palaniyappan (P-24), E.L. Vold (XCP-2),

continued on next page



Far left: Front view of the target showing a diamond foil and a gold foil mounted on a silicon substrate with a hole. (Right): Streak camera image of the expanding gold and diamond into a vacuum. At time 0, the ions heat both gold and diamond instantaneously, triggering them to expand into a vacuum.

Rapid cont.

M.A. Santiago Cordoba and C.E. Hamilton (MST-7),
B.J. Albright (XCP-6), and J.C. Fernández (P-24).

This work was performed at LANL, and was supported by the LANL Laboratory Directed Research and Development program. The work supports the Lab's Nuclear and Particle Futures and the Materials for the Future science pillars. This work also supports the Defense Programs LANL mission.

Technical contact: Woosuk Bang

Los Alamos imaging system going live at Fukushima Daiichi

First step toward dismantling reactors is identifying nuclear fuel's location

By the end of 2015, a muon imaging system pioneered at Los Alamos National Laboratory will be deployed at Japan's Fukushima Daiichi power plant. The goal is to reveal the amount, condition, and location of highly radioactive nuclear fuel remaining inside the reactors, without exposing workers to the high radiation fields inside the reactor facilities.

The Los Alamos Threat Reduction Team in Subatomic Physics (P-25), together with Toshiba Corporation and Decision Sciences International Corporation (DSIC), will image reactor unit No. 2 using cosmic muons. The Los Alamos technique will provide Tokyo Electric Power Company with a "map" so it can safely remove nuclear fuel from the plant, which was severely damaged in a 2011 tsunami and earthquake, leading to concerns that molten nuclear fuel spread from the reactor core to the pressure and containment vessels.

The imaging system is being assembled at a Toshiba facility in Japan, and consists of two ~7m x 7m tracking detectors made of gas-filled drift tubes provided by DSIC, which are read out by Toshiba electronics. One detector will be deployed in front of the reactor building, the other on the second floor of the turbine building on the opposite side of the reactor unit. The Los Alamos team developed tracking software and recently tested it on data taken with a smaller prototype. Muon radiography uses secondary particles called muons, generated when cosmic rays collide with upper regions of Earth's atmosphere, to create images of the objects that the particles penetrate. Los Alamos researchers, in particular, exploit muons' multiple scattering in the object of interest to obtain three-dimensional images. This imaging technique was first pioneered by Christopher Morris (P-25) more than 10 years ago.

The work supports the Laboratory's Global Security mission area and the Science of Signatures science pillar. Los Alamos's muon tomography technology is also deployed in locations around the world to help detect smuggled nuclear materials.



Courtesy of Mark Saltus, DSIC

The detector, currently mounted in horizontal mode, at the Toshiba facility in Yokohama where the detectors were assembled.

Los Alamos participants include: Jeffrey D. Bacon, J. Matthew Durham, Joseph M. Fabritius II, Elena Guardincerri, Christopher Morris, Kenie O. Plaud-Ramos, Daniel C. Poulson, Zhehui Wang, and Shelby Fellows (all P-25).

Muon tomography and development of its application at Fukushima were made possible in part through Los Alamos's Laboratory-Directed Research and Development program, which uses a small percentage of the Laboratory's overall budget to invest in new or cutting-edge research.

Technical contact: Elena Guardincerri

Determining how much energy is released during the fission of plutonium

The energy released when a heavy element such as plutonium undergoes nuclear fission could be used to drive both reactors and nuclear weapons. Most of this energy is released in the form of kinetic energy of the fission fragments formed in the process, and almost all of the local heating in reactor fuel is deposited as fission fragments decelerate inside the core. Although the total kinetic energy (TKE) in fission has been measured carefully for low incident energy neutrons in the past, there is almost no information for high-energy neutrons such as those produced in nuclear fusion. The lack of data at high neutron energies is mainly due to the safety concerns associated with handling plutonium, and the limited number of high intensity fast neutron sources. The Los Alamos Neutron Science Center (LANSCE) is one of a handful of facilities in the world that routinely performs experiments on plutonium and provides high-intensity, fast neutron beams. For the first time, scientists at LANSCE have now measured how the total kinetic energy of Pu-239

continued on next page

Energy cont.

changes as a function of incident neutron energy spanning up to 30 MeV.

A team of LANSCE Weapons Physics (P-27) researchers conducted the experiments. Oregon State University prepared the plutonium sample, which consisted of a thin deposit of the material on a carbon film attached to an aluminum ring. The researchers mounted the sample in a double-sided ionization chamber and irradiated it with neutrons at the Lujan Center and Weapons Neutron Research facilities at LANSCE. They measured the total kinetic energy release per fission. The experiment ran for several weeks and successfully collected data for all the incident neutron energies of interest. The high efficiency of the instrument combined with intense LANSCE beams and a new acquisition system enabled fission output measurements across 11 orders of magnitude incident neutron energy.

The new experiment confirmed what theory had predicted: that kinetic energy released in the fission of plutonium is significantly reduced as the incident neutron energy is increased. As a consequence, less kinetic energy than previously thought is released when fission is induced by fusion neutrons.

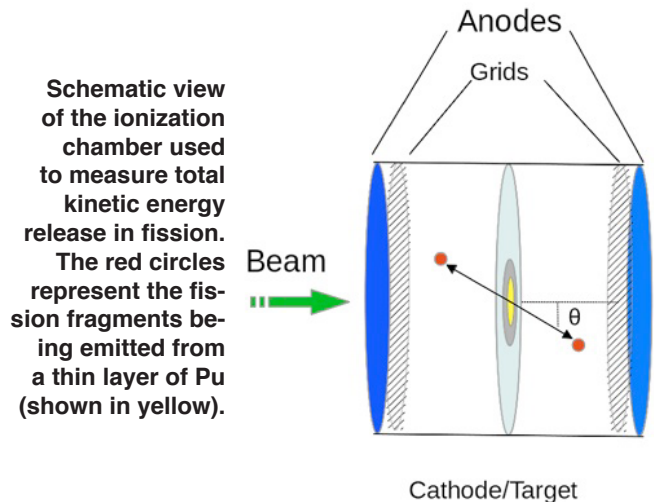
Reference: "A Fission Fragment Detector for Correlated Fission Output Studies," *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* **757**, 75 (2014). Authors include: S. Mosby, F. Tovesson, A. Couture, R. Meharchand, K. Meierbachtol, J. M. O'Donnell, B. Perdue, and D. Richman (P-27); D. L. Duke and D. Shields (P-27 and Colorado School of the Mines); and V. Kleinrath (P-27 and Idaho State University).

NNSA Campaign 1: Primary Assessment Technologies (Program Manager Stephen Sterbenz) funded this research.

Celebrating service

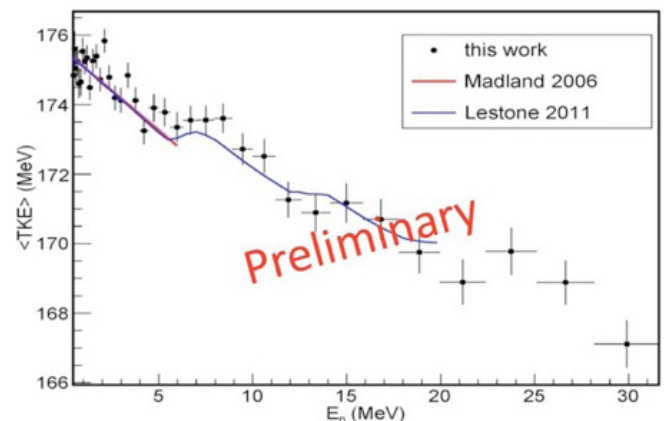
Congratulations to the following Physics Division employees celebrating service anniversaries recently:

Celine Apodaca, P-24.....	35 years
John O'Donnell, P-27	15 years
Russell Olson, P-23.....	15 years
Eric Loomis, P-24	10 years
Mark Makela, P-25	10 years
Tim Medina, P-27	10 years
Jan Sandin, P-21	10 years
Robert Aragonex, P-24.....	5 years
James Carroll, P-21	5 years
Jason Gochanour, P-27.....	5 years
Daniel Lemieux, P-24	5 years
Brittney Vigil, P-27	5 years



This work benefited from the use of the LANSCE accelerator facility, which the DOE, National Nuclear Security Administration, Office of Science, and Office of Nuclear Energy, Science and Technology sponsor. F. -J. Hamsch (Institute of Reference Materials and Measurements, Geel, Belgium) constructed the ionization chamber used for this experiment, and Walter Loveland (Oregon State University) prepared the plutonium and uranium samples that made the experiment possible. Extending measurements to incident neutron energies well beyond thermal enables testing of modern theoretical models. The new nuclear data support the Laboratory's Nuclear Deterrence mission area. Nuclear science research at LANSCE is a key capability that supports the Lab's Nuclear and Particle Futures science pillar. This research will be part of Duke's PhD thesis at Colorado School of Mines, where she studies total kinetic energy release and other aspects of the nuclear fission process using LANSCE capabilities.

Technical contact: Fredrik Tovesson



Preliminary results for the total kinetic energy (TKE) in fission of Pu-239. The experimental result is compared with theoretical calculations.

HeadsUP!

Team wins gold for reclaiming lead bricks

For relocating 25 crates of lead bricks, which had been stored outdoors for approximately 15 years and making plans to repurpose them, a multi-division team spearheaded by Physics Division has won a LANL

2015 Pollution Prevention Gold Award in the Environmental Management Systems category. In 2014 Physics Division took ownership of the 150-year-old lead bricks, believed to have originated in the Boston sewer system.



Mitzi Boswell (Neutron Science & Technology, P-23) initiated the idea and wouldn't take "no" for an answer. Special high-fives go to project lead Keith Rielage (P-23) and Mark Peters (Applied Modern Physics, P-21) and Julian Lopez (Subatomic Physics, P-25) who donned full-body personal protective equipment and full-face respirators in the August heat, preparing 2-ton wood crates for safe and secure transportation; and to Jeanette Gray (Division Office) who gave unwavering support as one of the designated procurement representatives.

The 18-member "Leading LANL's Legacy Lead to LAN-SCE" team is named here: int.lanl.gov/environment/p2/_assets/AwardWinnersByCategoryProject.pdf.

Fohtung named Los Alamos Neutron Science Center 2015 Rosen Scholar

Edwin Fohtung has been named the 2015 Rosen Scholar at the Los Alamos Neutron Science Center (LANSCE). He is the LANSCE Professor in conjunction with the Department of Physics at New Mexico State University. A materials physicist, Fohtung earned his PhD from the University of Freiburg, Germany and performed research at ANKA Synchrotron Light Source Facility at Germany's Karlsruhe Institute of Technology. During this time he became fascinated with the use of neutrons and (in) coherent photons for studying a wide range of condensed and soft matter systems. His research explores, via experimental and numerical modeling, the use of neutron and coherent scattering techniques, optical (laser-based) pump-probe experimental techniques, and pulsed electric and magnetic fields to probe a variety of emergent soft and condensed matter systems. Fohtung also provides scientific consultation for the future LANL signature facility: Matter Radiation Interaction in Extremes (MaRIE) project. He is a guest editor of the *Journal of Optics* special issue on coherent diffractive imaging, a member of the Oak Ridge National Laboratory Neutron Sciences-Science Review Committee, and the recipient Department of Defense-Air Force Office of Scientific Research and Los Alamos National Security/Department of Energy awards.



The Rosen Scholar fellowship was created to honor the memory of Louis Rosen, whose outstanding leadership and scientific career at LANL covered six-and-a-half de-

acades and included conception of the Los Alamos Meson Physics Facility, which was commissioned in 1972. Now LANSCE, the facility continues to play a paramount role in basic sciences and national security needs for the country. The Rosen Scholar fellowship is intended to attract visiting scholars to LANSCE in the fields of nuclear science, materials science, defense science, or accelerator technology. The Rosen Scholar is reserved for individuals whose career accomplishments in fields of research covered by LANSCE facilities are recognized as outstanding by the scientific community and exemplify the innovative and visionary qualities of Louis Rosen.



Published by the Experimental Physical Sciences Directorate

To submit news items or for more information, contact Karen Kippen, ADEPS Communications, at 505-606-1822, or kippen@lanl.gov.

For past issues, see www.lanl.gov/orgs/p/flash_files/flash.shtml



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